1)

$T_0 = 210$

$T_A = 68$

$t_1 = 10$

$T_1 = T(t_1) = 200$

$T_2 = T(t_2) = 180$

$t_2 = ?$

$$T(t) = T_A + (T_0 - T_A)\, e^{-kt}$$

$$T_1 = T_A + (T_0 - T_A)\, e^{-kt_1}$$

$$e^{-kt_1} = \frac{T_1 - T_A}{T_0 - T_A}$$

$$-kt_1 = \ln \frac{T_1 - T_A}{T_0 - T_A} \qquad k = \frac{1}{t_1} \ln \frac{T_0 - T_A}{T_1 - T_A}$$

$$T_2 = T_A + (T_0 - T_A)\, e^{-kt_2}$$

$$e^{-kt_2} = \frac{T_2 - T_A}{T_0 - T_A}$$

$$-kt_2 = \ln \frac{T_2 - T_A}{T_0 - T_A} \qquad t_2 = \frac{1}{k} \ln \frac{T_0 - T_A}{T_2 - T_A}$$

$$t_2 = t_1 \ln \frac{T_0 - T_A}{T_2 - T_A} \Big/ \ln \frac{T_0 - T_A}{T_1 - T_A} \approx 3{,}25\, t_1 = 32.5$$

The answer closest is C: 35 minutes

2)

$t_1 = 6$

$T_A = 50$

$T_1 = 66$

$k = 0{,}1947$

$t_0 = ?$

$T_0 = 96{,}8$ (normal human's temperature)

$$T(t) = T_A + (T_0 - T_A)\, e^{-k(t - t_0)}$$

$$T_1 = T_A + (T_0 - T_A)\, e^{-k(t_1 - t_0)}$$

$$e^{-k(t_1 - t_0)} = \frac{T_1 - T_A}{T_0 - T_A}$$

$$-k(t_1 - t_0) = \ln \frac{T_1 - T_A}{T_0 - T_A}$$

$$t_1 - t_0 = \frac{1}{k} \ln \frac{T_0 - T_A}{T_1 - T_A}$$

$$t_0 = t_1 - \frac{1}{k} \ln \frac{T_0 - T_A}{T_1 - T_A} = 6 - 5.5 = 0.5 \text{ (hours)}$$

The closest answer is D (12a.